Purple Line
Transit-Oriented Development
Guidelines and Principles

Bethesda
Chevy Chase Lake
West Silver Spring
Woodside
Silver Spring
Takoma/Langley
University/Riggs
University of Maryland
College Park
Riverdale
New Carrollton

Maryland Department of Transportation

PB PARSONS BRINCKERHOFF

January 2003

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Introduction

Transit-Oriented Development is a place of relatively higher density that includes a mixture of residential, employment, shopping and civic uses and types located within an easy walk of a bus or rail transit center. The development design gives preference to the pedestrian and bicyclists, and may be accessed by automobiles.

Governor's Transit-Oriented Development Task Force

This Transit-Oriented Development (TOD) guidebook is a synthesis of "best practices" to help policymakers, planners and developers throughout Maryland facilitate the broader implementation of TOD.

Nationally, there are nearly 100 different TOD guidebooks. This compendium of best practices is based on a comprehensive review of over 15 North American TOD guidebooks. Decisions about what information to include were based on numerous telephone interviews with the original guidebook authors and transit agency staff. The interviews provided critical insights on what to include in this guidebook.

Twin Creeks Development Company/Martin Kyle-Milward

Parsons Brinckerhoff

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TOD is one of the most important tools available to shape growth and breathe vitality into the areas in ways that support Maryland's Smart Growth agenda.

This guidebook is organized into five main sections that are described below. Each section describes relevant issues, the state-of-the-practice for TOD, and includes recommendations from the research material and interviews. The Appendix provides a checklist for evaluating TOD projects.

- **General Principles of TOD:** This section discusses the character and potential of TOD for communities and neighborhoods; why TOD is important; the benefits of TOD; and the major barriers of implementing TOD.
- **How to Design a TOD:** The design of TOD synchronizes transit planning with compact mixed-uses, higher densities, pedestrian scale amenities and architecture, strong connections to the surrounding community, carefully designed streets, and relevant park and open spaces. This section is divided into 6 sub-sections: Pedestrian Friendly Areas, Transit-Friendly Zoning, Density, Mixed-Uses, Buildings and Architecture, and Providing Usable Public Open Space.
- **How to Design Development-Oriented Transit:** Designing transit with development in mind is key to TOD success. The planning and design of transit facilities and how transit fits into the community are discussed.
- **Streets and Parking:** Designing a multi-modal circulation system and providing for parking can be the most challenging aspect of TOD. This section focuses on integrating walking, bicycling, transit and automotive routes and managing parking.
- **Pedestrian and Bicycle Facilities:** This section discusses how pedestrians and bicyclists interact with the urban environment. The comfort level they feel is largely due to how well the pedestrian and bicycling environment is designed.
- **Creating a Framework for TOD:** Establishing TOD in the community is more complex than incorporating good urban design and designing transit facilities. It requires communication, cooperation, and teamwork between the public and private sectors.

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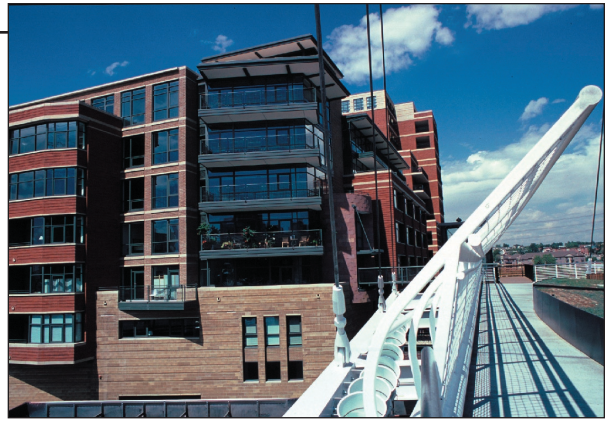

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- **Lessons Learned:** This section summarizes our research and provides important lessons for planners, public agencies, and private developers interested in successfully implementing TOD.
- **Appendix:** The Appendix contains a checklist for evaluating TOD projects in your community and the bibliography.

1 General Principles of TOD

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> "Transit-oriented communities are characterized by design and development patterns that are condusive to the use of transit."
>
> Federal Transit Administration, Building Livable Communities with Transit, Office of Planning, September, 1999

General Principles of TOD

TOD is a strategy that has broad potential in both large urban and small communities using bus or rail transit systems. TOD focuses compact growth around transit stops, thereby capitalizing on transit investments by bringing potential riders closer to transit facilities and increasing ridership. TOD can also produce a variety of other local and regional benefits by encouraging walkable compact and infill development.

TOD draws on many of the same planning and development principles embraced by New Urbanism, Smart Growth, and the Livable Communities movement:

- Moderate to higher density development in relation to the existing pattern of development,
- A mix of land uses, horizontally or vertically mixed,
- Compact pedestrian-oriented design and streetscapes,
- Building design and orientation to the street to allow easy pedestrian and transit access,
- A fine-grained connected street pattern without cul-de-sacs, and
- A system of parks and open spaces.

In addition to these principles, for development to be transit-oriented, it generally needs to be shaped by transit in terms of parking, density, and/or building orientation in comparison to conventional development. It is not enough that it is just adjacent to transit.

Local governments play a significant role in promoting TOD through plans, policies, zoning provisions, and incentives for supportive densities, designs, and mix of land uses. A successful TOD will reinforce the community and the transit system. This checklist is intended to guide communities in reviewing proposed projects and in assessing the transit-friendliness of current land use codes and ordinances.

TOD has broad potential in both large urban and small communities using bus or rail transit systems.

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Successful TOD implementation typically involves a number of elements such as: optimal transit system design; community partnerships; understanding local real estate markets; planning for TOD; coordination among local, regional, and state organizations; and providing the right mix of planning and financial incentives and resources.

Why TOD?

TOD is a strategy available to help manage growth and improve Maryland's quality of life. TOD provides communities with an alternative to the consequences of low-density suburban sprawl and automobile-dependent land use patterns. In addition, TOD can help answer Maryland's need for more affordable housing.

TOD seeks to align transit investments with a community's vision for how it wants to grow, creating "livable" mixed-use, denser, walkable "transit villages". By implementing TOD, Maryland can make significant progress towards improving its quality of life and coordinate investments in transportation and land use projects.

Benefits from TOD:

- **"TOD Can Provide Mobility Choices.** By creating "activity nodes" linked by transit, TOD provides important mobility options, which are very much needed in the state's most congested metropolitan areas. This also allows young people, the elderly, people who prefer not to drive, and those who don't own cars the ability to get around.
- **"TOD Can Increase Public Safety.** By creating active places that are busy through the day and evening and providing "eyes on the street," TOD helps increase safety for pedestrians, transit-users, and others.
- **"TOD Can Increase Transit Ridership.** TOD improves the efficiency and effectiveness of transit service investments by increasing the use of transit by 20 to 40 percent.
- **"TOD Can Reduce Rates of Vehicle Miles Traveled (VMT).** For years vehicle travel in California has increased faster than the state's population. TOD can lower annual household rates of driving by 20 to 40% for those living, working, and/or shopping near transit stations.

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- **"TOD Can Increase Disposable Household Income.** Housing and transportation are the first and second largest household expenses, respectively. TOD can free-up disposable income by reducing the need for more than one car per household and reducing driving costs, saving $3-4,000 per year for each household.
- **"TOD Can Reduce Air Pollution and Energy Consumption Rates.** By providing safe and easy pedestrian access to transit, TOD can lower rates of air pollution and energy consumption. Also, TOD's can help reduce rates of greenhouse gas emissions by 2.5 to 3.7 tons per year for each household. [1]
- **"TOD Can Help Conserve Resource Lands and Open Space.** Because TOD consumes less land than low-density, auto-oriented growth, it reduces the need to convert farmland and open spaces to development.
- **"TOD Can Play a Role in Economic Development.** TOD is increasingly used as a tool to revive aging downtowns, revitalize declining urban neighborhoods, and enhance tax revenues for local jurisdictions.
- **"TOD Can Contribute to More Affordable Housing**. TOD can add to the supply of affordable housing by providing lower-cost housing and by reducing household transportation expenditures. It was recently estimated that housing costs for land and structures can be significantly reduced through more compact growth patterns.
- **"TOD Can Decrease Local Infrastructure Costs.** Depending on local circumstances, TOD can help reduce infrastructure costs (such as for water, sewer, roads) to local governments and property owners by up to 25% through mnore compact infill development."[2]

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Major Barriers to TOD Implementation

"The community and transportation benefits of TOD can be significant, but there are still many major barriers that limit the broader implementation of TOD including:

- **"Transit System Design.** The design of transit systems can be a major barrier to successful TOD. Stations often have poor pedestrian access and ignore the surrounding local community. Broad expanses of surface-level commuter parking often separate the stations from the surrounding community, and stations and transit corridors are often located in areas with challenging development conditions, reducing transit's ability to link activity centers.
- **"Local Community Concerns.** To local neighborhoods, proposals for TOD projects often are associated with concerns about changing the character of a community. Even with quality design and appropriate density, and despite local government support for a TOD, community concerns about density and traffic are often huge hurdles to implementation.
- **"Local Zoning Not Transit-Friendly.** In most major transit station areas in the state, local zoning has not been changed to reflect the presence of transit. Local development codes around stations often tend to favor low density, auto-oriented uses. Creating and implementing transit-friendly zoning becomes a challenge.
- **"Higher Developer Risk and Cost.** Mixed-use, higher density projects with reduced amounts of parking (such as in TOD) can significantly increase risks for developers and financers. TOD can be more costly, and can be subject to more regulations and more complex local approval processes, as compared to conventional 'auto-oriented' development.
- **"Financing Difficult to Obtain.** Obtaining private financing for TODs is often also a barrier. Lenders typically have concerns about financing mixed-use projects or those with lower parking ratios (which are typical in TOD). Public financing available for implementing TOD is very limited and often difficult to obtain..."[3]

Endnotes

1. Parsons Brinckerhoff and Caltrans, Factors for Success in California's Transit-Oriented Development: Statewide Transit-Oriented Development Study, 2002
2. ibid
3. ibid

2 How to Design a Transit-Oriented Development

Twin Creeks Development Company/Martin Kyle-Milward

By developing "pedestrian-friendly" projects, the development risk of whether or not transit will arrive is avoided. If the project works for the pedestrians, it will work for transit.

Pedestrian-Friendly Areas

"In pedestrian friendly areas, land use activities are designed and arranged in a way that emphasizes travel on foot rather than driving by car. Creating an environment at pedestrian scale requires careful consideration of the dimensions of the human body and the proportions of the spaces that people use. The factors that encourage people to walk are often subtle, but they most regularly focus upon the creation of pleasant environments for the pedestrian.

"Most people do not feel comfortable walking in a wide-open area with busy traffic passing closely by. Pedestrians are drawn to streets and paths with a feeling of intimacy and enclosure. This feeling can be created by locating buildings close to the sidewalk, by lining the street with trees, and by buffering the sidewalk with planting strips or parked cars. People on foot enjoy small details, such as displays in shop windows, street level lighting and signs, and public art and displays."[1]

"Increasing the likelihood that people will walk to and within a station area significantly increases the probability that they will use public transit and improves the viability of the entire station community. A walkable environment is key to a successful TOD community. Just locating a mix of high-density development does not guarantee a good walking environment. Success in attracting people to walk rather than drive depends on the quality of the walkways, type of destinations, perceptions of safety, and number of obstacles or conflicts encountered along the way. If projects are to be more transit-oriented, they must be sensitive to the differing requirements of pedestrians, bicyclists and transit customers."[2]

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Sustainability, Conservation and Restoration

"Sustainable growth takes place at the regional, neighborhood and site scales. Regionally, sustainable growth takes into account building, transportation, and natural layers, concentrates development and reinvestment in existing built-up areas and transit-served neighborhoods, and conserves agricultural preservation areas, valuable natural landscapes, and ecologically precarious lands. Sustainability also comes from creating distinct communities, whether in existing neighborhoods, redevelopment areas or new growth districts, that people take pride in and feel like they have a stake in maintaining and improving. Bringing usable open spaces and functioning ecological features into metropolitan landscapes provides an oft-needed connection to the natural world and a healing respite for urban dwellers. Redevelopment by cleaning up contaminated sites, or restoration of degraded natural features, minimizes environmental impacts and begins to reverse previous environmental destruction. Finally, sustainable urban forms aid air quality by relying on transit, walking and bicycling for transportation, and minimizing auto use."[3]

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A Defined Neighborhood Center

"A Defined neighborhood center serves as the focus of community life. Six key design principles refocus new investment to recreate traditional centers to take advantage of existing transit facilities to create pedestrian friendly retail, entertainment, employment, educational, and housing options for all community members.

- A successful transit-oriented neighborhood center…
- Is a core of compact development focused around bus and rail stations
- Is the corner of community life by providing opportunities to shop, work, live, learn and play
- Has a defined boundary and character distinct from the surrounding neighborhood
- Emphasizes six key design principles:
  - Orientation and Connectivity
  - Quality Public Realm and Amenities
  - Pedestrian Friendly, Safe Environment
  - Attractive Architecture and Design
  - Mix of Uses
  - Creative Parking Management"[3]

City of San Diegon

Develop a Shared Vision for the Project

"Address the future needs of the community and of the transportation agency; and specify short- and longer-term goals, immediate action steps, and additional partners. Seek ways to solve problems, overcome obstacles, and innovate and identify a range of funding sources that may be available to the community or to the transportation agency."

Project for Public Places, Inc., How Transportation and Community Partnerships are Shaping America, Part 1: Transit Stops and Stations, 1999

Transit-Friendly Zoning

TOD is part of a land use and transportation strategy that works best when enabled through clear and predictable development entitlements, transit-friendly zoning, and design standards. Legally defensible TOD zoning codes and design standards give planning departments a framework to shape development and developers with buildings guidelines.

"Although transit-oriented development has been hailed for a number of years as an excellent alternative to conventional low-density development, it has still not been institutionalized within the permit and regulatory environment of most jurisdictions of the nation and region. According to a report published in the *New Urban News*, for every dollar invested in transit-supported land use developments, over $1,400 is still invested in conventional suburban development. For this to change, local communities will have to take a hard look at how their zoning and development codes either frustrate or accommodate station area development activities.

"Described below are three ways of creating a more effective regulatory and permit review environment for transit-oriented development:

- Modify zoning and development regulations to encourage, rather than discourage, transit-oriented development.
- Develop appropriate mechanisms to ensure that regulations are tailored to individual station areas.
- Simplify and streamline the permit review process."[5]

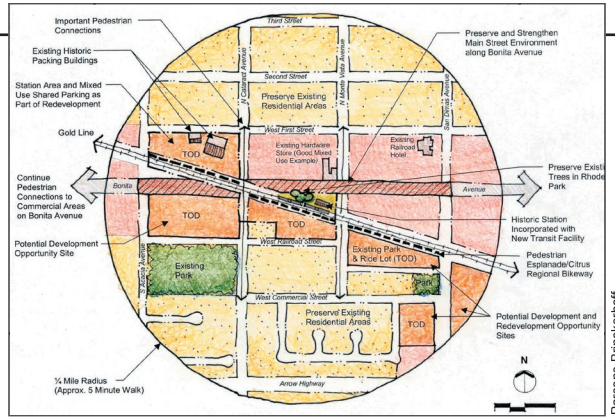
Prohibited Uses

To help assure a return on the public's investment in major transit facilities, some communities have prohibited low intensity automobile-oriented uses in the areas near transit stations.

"The following uses are prohibited within an underlying commercial zone as both principal and accessory uses, except as otherwise noted:

A. Drive-in businesses;
B. Dry storage of boats;
C. General manufacturing;
D. Heavy commercial services, except laundry facilities existing as of April 1, 2001;
E. Sales and rental of large boats;
F. Vessel repair (major or minor);
G. Mini-warehouse;
H. Principal use, nonresidential long-term parking;
I. Outdoor storage;
J. Sale of heating fuel;
K. Sales, service and rental of commercial equipment and construction materials;
L. Salvage and recycling;
M. Towing services;
N. Vehicle repair (major or minor);
O. Wholesale showroom;
P. Mini-warehouse; and
Q. Warehouse."

Seattle Municipal Code
Seattle Station Area Overlay District
Ordinance 120452
July 30, 2001



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Modify Zoning and Development Regulations

"Many local zoning codes unwittingly discourage transit-oriented development through regulations designed to promote automobile-oriented, single-purpose, suburban-scale development. Identifying and eliminating these regulatory barriers is a necessary first step for creating successful transit station communities. This process is sometimes described as a regulatory audit."[6]

New Zone Classifications

"The most common and basic way to implement new land use objectives is to create new zone classifications that can be used within a defined station area. This approach is useful if the land use objectives in other parts of the jurisdiction are much different, and minor modifications to existing classifications will not work. Emerging urban areas may need to use new classifications if they are to achieve some of the more dramatic changes needed at their station areas."[7]

Transit Overlay Zone

"If the current zoning only needs minor modifications, an "overlay zone" might be appropriate. An overlay zone retains the existing zoning, but adds some supplemental provisions that apply only to the station area. In some cases an overlay zone is more restrictive, such as prohibiting auto-oriented uses, while in other cases it may be more flexible, such as allowing existing parking spaces as part of the new development requirement. The advantage of an overlay zone is that you can tailor regulations for a specific area without having to add an entirely new district to your zoning code."[8]

New Zoning Districts

"Another approach is to create an entirely new zoning district with its own land uses and development standards. An advantage to an entirely new zoning district is that regulations can be specifically tailored to objectives and can be made clear and simple."[9]

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> "Transit agencies must get the word out to local planning departments and developers that they have an interest in site design and can offer valuable suggestions."
>
> Snohomish County Transportation Authority, Participating in Community Planning: Ideas for Public Transit Agencies, October 1993

Minimum Density

"One zoning technique for achieving higher densities is to require minimum densities, but this approach can be tricky. If minimum densities are set too high, development is discouraged and locates elsewhere, often in areas poorly served by transit. If no minimum density standards are set, development occurs in areas at densities too low to support good transit service. To achieve workable minimum density standards, the following strategy is recommended: find the maximum density that the market can support and make that the minimum density."[10]

Design Guidelines

"Another way to ensure that land use regulations are tailored to a community is to develop and use transit-oriented development design guidelines.

"Design review can be an important regulatory tool for developing transit-oriented communities. Generally, design guidelines are used in conjunction with zoning requirements in directing new development to achieve public objectives. Whereas zoning codes can regulate quantifiable and easily determined characteristics such as use, height, bulk and setbacks, design guidelines are more successful in addressing other objectives such as building design, pedestrian orientation, building scale with respects to its surroundings and special site design issues. While zoning provisions usually rely on specific formulas or criteria, design guidelines can be much more flexible."[11]

There is no magic number an appropriate density target for all transit station communities

Puget Sound Regional Council, Creataing Transit Station Communities in the Puget Sound Region - A Transit-Oriented Development Workbook.
June 1999

Density/Intensity Thresholds for Transit

Transit Service	Residential Density (DU/A)[1]	Employee Density (E/A)[2]
Local Bus Service with 1 Hour Headways	4 - 6	NA[5]
Local Bus Service with ½ Hour Headways	7 – 8	25
Local Bus with 10 minute Headways and Express Bus	15 – 24	50 – 75 for Work Trips 75 for Shopping Trips
Fixed Guideway[3]	9 – 25	>75[4]

Table Notes:
1. Residential density is measured in dwelling units per acre of land.
2. Employee density is measured in employees per acre.
3. Densities may be significantly lower for commuter rail traffic relying on park and ride commuters.
4. Based on Parsons Brinckerhoff comparative data of employment served by LRT systems.
5. NA – not available

Sources:
Frank and Pivo (1994)
Parsons Brinckerhoff Quade & Douglas, TCRP Report 16 (1996)
Freilich Leitner & Carlisle and Planning Works (2002)

Density

Establishing Density Targets

"Although density is only one variable influencing transit use, numerous studies have found that transit ridership increases significantly with increased land use density. There is no magic number for an appropriate density target for all transit station communities. Many different variables should influence any density targets that are established. For example, household densities can be lower if employment and commercial densities are high, and vice versa. Transit stations without associated parking would require higher densities than those with parking available; and rail stations with 5-10 minute headways would obviously support higher densities than those with 30 minute headways."[11]

"Residential development near stations provides a ready market for transit trips. A variety of housing types, costs and ownership will establish diversity in a community and will lead to more transit trips throughout the day. More people will be around the [transit facility] and supporting local commercial establishments. Research indicates that 15 housing units per gross acre will support a high level of bus or rail service to a station area. High-density single family, townhouses, and apartments should be combined to achieve an adequate housing density. To maintain a good balance of activity, the number of jobs in the station area should not exceed the number of households by more than 3 to 1."[12]

"To ensure that a mix of different land use activities is created within a station area, jurisdictions in other regions have established targets for mixed-use development. Below are some examples. Actual development may need to be monitored and zoning adjusted if targets are not met. Local targets should be based on specific station area land use goals.

- Public Uses, including park space and civic uses: 5 to 15% of total land use area.
- Commercial retail space: 10 to 50% of total land use area.
- Residential development: 20 to 80% of total land area.
- Employment: 20 to 60% of total land area."

Puget Sound Regional Council, Creating Transit Station Communities in the Central Puget Sound Region - A Transit Oriented Development Workbook, June 1999

Parsons Brinckerhoff

Diversity and Balance

"Heterogeneous communities meet the needs of a society that is increasingly diverse in its needs, cultures, demographics, and daily living habits. Diversity can manifest in numerous ways in the built environment. Development that has a mix of uses provides a traditional urban form, a contrast to isolated suburban environments, where shopping, friends' houses, and other destinations are frequently inaccessible without a car. TODs can also enable diversity by creating mixed-income housing, or greater variation of housing types such as residential units located over commercial uses or 'granny flats' behind single-family homes. Housing choice provides for a range of incomes and a range of family types in an inclusive environment that does not leave out major segments of the population. In turn, this gives all people who may work in or visit a community, such as teachers and single-parent households, affordable options to live there. Lastly, architectural and streetscape diversity provides aesthetic relief from frequently monotonous suburban environments."[13]

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Mixed-Uses

Establish a Compact Mix of Land Uses within a Defined Station Area

"A station area should generally include parcels within one-quarter mile to one-half mile walking distance of the transit facility. However, barriers such as busy streets or steep slopes can reduce this distance, while pleasant walking routes, such as an unrestricted pedestrian path, can increase the size of the pedestrian area. Each station area should be specifically defined based on local conditions, including the level of transit service provided, the likely purposes of the trips to be taken, and the pedestrian qualities in the immediate vicinity of the facility. Within a defined station area, the mix and density of land uses should be planned based on the location and access to the station. The highest density developments should, ideally, be located closest to the transit facility."[14]

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A Checklist for Plannning a Mix of Land Uses

- Are land uses complementary?
- Are uses linked by sidewalks or paths?
- Do uses create all day activity?
- Are uses within walking distance?
- Do buildings fit in with each other?"

Puget Sound Regional Council, Creating Transit Station Communities in the Central Puget Sound Region - A Transit Oriented Development Workbook, June 1999

Encourage Mixed-Uses within Buildings and on Adjacent Sites

"Mixed-use can occur when more than one land use is within a single building or when different uses are located in separate buildings close to each other. The important component is that good walking access must exist between the different land uses. Mixed-use within buildings (known as "vertical mixed-use") is an excellent way to increase building density while integrating mutually supportive land uses. Residential above commercial will create all day activity and a functional place for pedestrians while increasing transit ridership. The same can be achieved with mixed-use in separate buildings (known as "horizontal mixed-use") if they are in close proximity and have adequate pedestrian connections."[15]

"All TODs must be mixed-use. In addition, a certain minimum proportion of uses are required to stimulate pedestrian activity and to provide economic incentives for developing with mixed-use patterns. The proportion of uses is based on site area and does not preclude additional, different uses on upper floors. A minimum amount of retail, housing and public uses are required in all TODs. The different mix of uses for neighborhood TODs and urban TODs is intended to reflect the variations in intensity and type of development desired at these sites."[16]

Building Height/Street Width

"Harmonious proportion has, at least since 1784, been a major objective of regulations of building height along Paris streets. The two (street width) to three (height to the cornice line) proportion of streets had existed traditionally and was then formalized."

Allan B. Jacobs, Great Streets, Massachusetts Institute of Technology, 1999

Parsons Brinckerhoff

Buildings and Architecture

Urban Vitality

"Locating shops along the roadway attracts people to the area and helps create a dynamic, exciting environment in which pedestrians feel comfortable. Store windows add interest to the street and draw pedestrians along. Retail destinations close to the bus or trolley stop are an added incentive to use transit. Storeowners near active transit stops also benefit from sales to the casual, walk-in buyer."[17]


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Varied Architectural Design and Detail

"Varied details on the exterior of buildings and in the public spaces adds interest for pedestrians, patrons and residents. These details assist in defining a TOD and establishing a separate identity from other parts of a community. The exterior treatments also help in relating the building(s) to the sidewalk and other public areas."[18]

"A number of communities have developed provisions to reduce the effect of lengthy, unvaried, featureless facades or other structures lining the pedestrian route. A number of approaches can improve building interest, such as requiring street level display windows and other features of interest rather than blank walls along sidewalks and emphasizing building modulation (varying the setback of different sections of the building facade) to add variety."[19]

Farr Associates Architecture and Urban Design

Farr Associates Architecture and Urban Design

Green Building

”Green building practices can reduce energy costs and pollution while making buildings healthier and more productive for owners and users. Basics include good windows and insulation, reduced air infiltration, light-colored roofs, right-sized and efficient lighting and HVAC equipment, and interior materials that don’t emit harmful chemicals (surprisingly, most common materials do). Studies show that well-integrated green building design and construction can reduce energy use by 30% or more, enhance worker productivity (+6% to +16%), enhance retail sales (+40%), and even increase student test scores up to 20%. See www.usgbc.org for more information.”[20]

Building Orientation

”Buildings should be oriented to maximize the south-facing facade area. Inappropriate heat gains from sun can decrease comfort and increase energy costs (especially for air conditioning). Rooms on east-and west-facing facades can overheat, even in cooler months. Low morning/afternoon sun enters windows directly, penetrates deeply, and is hard to control. Sun from the south (mid-morning to mid-afternoon) is higher in the sky and penetrates less deeply into buildings. South-facing rooms are easily shaded from higher summer sun and can be warmed by lower winter sun, providing energy benefits in all seasons.”[21]

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Commercial Buildings

"The configuration of shops in a core area must seek a balance between pedestrian and auto comfort, visibility, and accessibility. While anchor stores may orient to the arterial and parking lots, smaller shops must orient to pedestrian "main" streets and plazas."[22]

"Primary ground floor commercial building entrances must orient to plazas, parks, or pedestrian oriented streets, not to interior blocks or parking lots. Secondary entries from the interior of a block will be allowed. Anchor retail buildings may have their entries from off street parking lots however, on-street entries are strongly encouraged."[23]

"Entries into small shops and offices should orient directly onto a pedestrian-oriented street. Buildings with multiple retail tenants should have numerous entries to the street; small single entry malls will be discouraged. Off street parking should also be located at the rear of buildings with paths or sidewalks leading to the street and entry."[24]

City of Vancouver, B.C., Planning Department

Residential Buildings

"As with commercial uses, residential entries should face the street to encourage public activity in the public realm and to welcome visitors from the on-street guest parking."[25]

"In all cases, primary ground floor residential building entrances must orient to streets, not to interior blocks or parking lots. Secondary and upper floor entries from the interior of a block will be allowed.

In residential areas, the front door and guest entry must orient to the street. Private back-door entries can provide access from alleys, garages, and parking lots. Ancillary units and upper floor units in multi family or apartment complexes may be accessed by rear entries."[26]

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> "I end then in praise of small spaces. The multiplier effect is tremendous. It is not just the number of people using them, but the larger number who pass by and enjoy them vicariously, or even the larger number who feel better about the city center for knowledge of them. For a city, such places are priceless, whatever the cost. They are built of a set of basics and they are right in front of our noses. If we will look."
> William H. Whyte
>
> Project for Public Spaces

Provide Usable Public Open Space

Integrated Parks and Open Spaces

"As density increases in centers and corridors, the need for usable public open space will also increase. Open space should be thoughtfully planned to avoid creating wasteful landscaped areas with little more than visual appeal. Instead, open space should be planned and designed for use by people, especially children and the elderly."[27]

Endnotes

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2. ibid
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4. DC Office of Planning, *Trans-Formation: Recreating Transit-Oriented Neighborhood Centers in Washington, D.C. – A Design Handbook for Neighborhood Residents*, September 2002
5. Puget Sound Regional Council*, Creating Transit Station Communities in the Central Puget Sound Region - A Transit-Oriented Development Workbook,* June 1999.
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15. ibid
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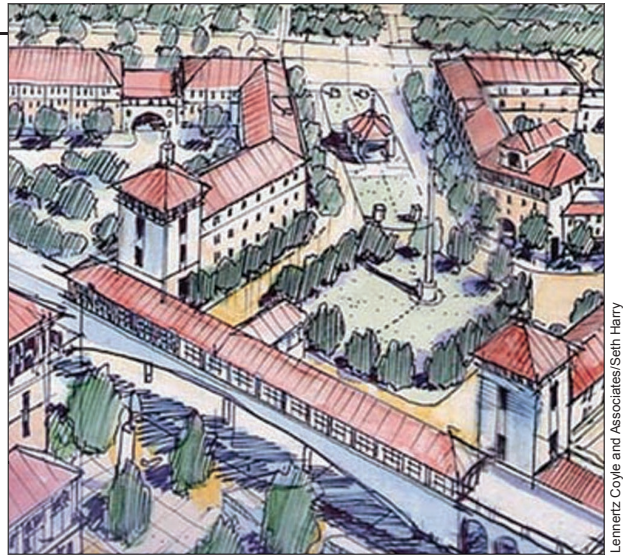
20. Farr Associates Architecture and Urban Design
21. ibid
22. Calthorpe Associates
23. ibid
24. ibid

25. ibid
26. ibid
27. Tri-County Metropolitan Transportation District

3 How to Design Development Oriented Transit



Lennertz Coyle and Associates/Seth Harry

The Principles of Development Oriented Transit.

- Locate the station in an area with development potential.
- Develop transit facilities in a compact, pedestrian-oriented manner; allow for direct pedestrian connections from the transit facility to adjacent communities.
- Don't allow surface park-and-ride lots to separate the station from the community it is serving; incorporate TOD into the transit facility as appropriate.
- Be a good neighbor.
- Use quality materials.
- Routinely maintain the facility.
- Design the transit investment from the community into the platform.

Development Oriented Transit Planning

Site the Station to Maximize Development Opportunities

In order to make TOD happen the developer must locate and design the transit facility in a manner that welcomes and facilitates development.

"Transit facilities should be planned, sited, and designed to be a major focus of the station area. To maximize pedestrian access, stations should be sited in areas that have or are planned to accommodate a high density of mixed land uses, including major employment locations, significant cultural or educational facilities, and other regional destinations. While park-and-ride lots are extremely important components to building the ridership of the overall transit system, they typically detract from the uses, densities and activities that create a pedestrian-oriented station community.

"Stations that will have a significant amount of parking (200 or more surface parking spaces) should be sited in locations where major development is not planned for the immediate future."[1]

Make the Station a Part of the Community

"At its core, a transit station community is a compact, mixed-use activity area centered around a transit station that by design encourages residents, workers, and shoppers to drive their cars less and ride mass transit more. The centerpiece of the transit community is the transit station – connecting the residents and workers to the rest of the region – and the civic and public spaces that surround it. The design, configuration, mix of buildings and activities emphasize pedestrian-oriented environments and encourage use of public transportation. The lands uses within a transit station community are linked with convenient pedestrian walkways, and parking is managed to discourage dependence on the automobile."[2]

Parsons Brinckerhoff

Development-Oriented Transit Facility Design

Site Relationship to Transit Stop
"The transit stop should be centrally located within the TOD."[3]

Transit station as community landmark
"A well-designed transit station can become a community-centering landmark in a TOD, both a distinctive central place that draws people by choice and necessity, and a symbol that people associate with their community's identity. The station's nodal importance can be expressed through a variety of design treatments. For example, stations can generate community landmark quality through distinctive and unique architecture, a style that picks up on the vernacular of surrounding buildings, or vertical punctuations that align with major community routes and can be seen through the neighborhood."[4]

Community Connection to Transit
"With rail systems, how to connect the station to the community involves a decision about whether the station will be at-grade with surrounding roads and buildings, or elevated from them. Elevated stations can provide greater system speed, but create a visual disconnect between areas on either side of the tracks. Elevated stations should contain pedestrian crossing over or under the tracks, or a station mezzanine level that contains exits to either side. At-grade light rail stations are preferable from an urban design standpoint. At-grade stations allow visual and pedestrian connections across the rail right-of-way, creating a coherent public space around the transit station and eliminating the need for dark underpasses that may become unsafe."[5]

Bus Stop Spacing
"Bus travel time and schedule reliability are important factors in attracting transit ridership. Too many stops slow bus operations and fail to provide sufficient distance between stops for safe stopping. Too few stops increase walking distances and decrease coverage. Striking a balance between convenient access and safe, timely operation increases bus competitiveness with cars."[6]

Lane Widths

"Provide a curbside lane width of 12 feet (exclusive of a bike lane) for normal bus operation on a mixed traffic roadway. Provide curbside lane width of 14 feet along roadway segments where operating speeds and bus frequency are higher or where on-street parking is available adjacent to the travel lane."

Tri-Met, Planning and Design for Transit Handbook, January 1996

Parsons Brinckerhoff

Transit Stop Facilities

"At a minimum, TOD transit stops shall provide shelter for pedestrians, convenient passenger loading zones, and secure bike storage."[7]

"Reasonable levels of weather protection, physical accessibility, and clearly understood transit information are important elements in promoting public use of the transit system."[8]

Bus Stop Placement

"Tri-Met uses the following guidelines as an initial tool for evaluating bus stop placement:

- locations,
- Identify closest bus stops,
- Ensure compatibility with adjacent properties,
- Allow adequate sight distance,
- Ensure pedestrian linkages and street crossings,
- Provide for adequate bus maneuvering,
- Evaluate travel time delays, and
- Evaluate signalization impacts."[9]

Parsons Brinckerhoff

Curb Extensions

"Curb extensions enhance the pedestrian environment by reducing street crossing distances and calming vehicular traffic...they also allow more on-street parking than bus zones do, and they also provide additional space for pedestrian and bus passenger amenities (e.g., shelter or bench, bicycle rack, trash receptacle).

Curb extensions usually are considered appropriate along streets with lower traffic speeds and/or reduced traffic congestion where it is acceptable to stop buses in the travel lanes. Collector streets in neighborhoods and the designated pedestrian districts are also good candidates for such treatment."[10]

Parsons Brinckerhoff

Bus Shelters

Tri-Met encourages private developers and other agencies to include passenger shelters as part of new developments when warranted. The most important criteria are as follows:

- Number of passengers boarding per day,
- Type of population served,
- Preparation required, and
- Availability of nearby shelter.[11]

Parsons Brinckerhoff

Bus Benches

"Providing bus benches without shelters is appropriate at some bus stops. Criteria for placing benches without shelters include the following:

- Locations where the regular number of riders does not warrant a shelter,
- Locations with adjacent site features (retaining walls, stairs, low fences) that attract riders onto adjacent property,
- High-use areas due to high levels of pedestrian movement over a small area,
- High ridership locations that have weather protections, but no seating,
- Transfer locations with buses on long headways, and
- Locations used by elderly and disabled persons."[12]

Trash Receptacles

"Tri-Met places trash receptacles only at existing bus stops in response to requests from the public. Tri-Met administers the Trash Receptacle Program, which identifies sponsors who will be responsible for maintaining the receptacles."[13]

Parsons Brinckerhoff

Lighting

"Site lighting is often determined by economies of scale and the particular configuration of a site. For functional reasons, lighting standards are located along the perimeter of the property and at interior locations within larger parking areas. Throughout the Portland region, jurisdictions have recognized the need to incorporate shorter ornamental lighting standards and brighter lighting levels in areas targeted for pedestrian activity. These standards provide the opportunity to focus brighter lighting levels in pedestrian areas, allowing lower levels elsewhere, and add to the legibility of the pedestrian network.

- To distinguish the pedestrian network, provide ornamental lighting no greater than 12 feet in height.
- To ensure pedestrian safety, provide .75 to 1.5 foot-candles of illumination along pedestrian routes and at bus stops.
- Place light posts in buffers between pedestrian pathway and driveways or roadways."[14]

Bus Landing Areas

"At a minimum, the ADA requires that all new and relocated stops have a landing area that meets the following requirements:

- Provide a 5-foot-wide by 8-foot-wide unobstructed paved landing area for bus lift operation.
- Ensure that the cross-slope of the landing pad does not exceed 2 percent.
- In curbed areas, construct the landing pad of concrete at least 4" in depth. In uncurbed shoulder areas, an asphalt landing pad is acceptable.
- For most buses, locate landing pads one foot from bus stop sign location. For buses with rear door lifts, locate the landing 23.5 feet from the bus stop sign."[15]

Parsons Brinckerhoff

Bus Stop Delineation

"Proper delineation of a bus stop will discourage general traffic from using the stop area and will direct bus operators where to stop. Delineation may include:

- Signing and striping the stop as a bus zone,
- Identifying the stop through curb markings, and
- Additional signage provided by the local jurisdiction"

Tri-Met, Planning and Design for Transit Handbook, January 1996

Roadway Pavement

"When fully loaded, a standard bus has a rear axle weight of 25,000 pounds (dual tires). With repeated use, substandard roadways will deteriorate."[16]

- "On typical roadways with fewer than 25 buses per day, design roadways with typical asphalt pavement sections.
- On roadways carrying 25 or more buses per day, incorporate concrete roadways to avoid the deterioration that typically occurs with asphalt, particularly in bus stopping and turning areas or areas with special soil conditions.
- At bus stops accommodating very high bus volumes, provide a reinforced concrete pad."[17]

Corner Radii

"Design curb radii to accommodate bus movements where appropriate. Curb radii may vary from 15 to 50 feet depending on site constraints and desirable operations. Where larger radii are developed, allow longer walk time at signalized intersections to accommodate increased pedestrian crossing distances."[18]

Obstructions/Clearances

"Generally, buses travel in the curbside traffic lane and make frequent stops to pick up and drop off passengers. Physical obstructions, such as utility poles and signs, must be set back far enough from the curb to allow space for bus 'tilt' from crowned roadway sections."[19]

Parsons Brinckerhoff

Parsons Brinckerhoff

Driveways

"Provide adequate distance between bus stops and driveways to prevent buses from blocking driveway traffic or sight lines. In constrained situations, buses may block driveways if other access is provided to the property and sight distances are maintained."[20]

Catch Basins

"Bus stops should not be located where a bus wheel will stop on a catch basin or storm drain because that could cause the bus to lurch or change direction. Repeated loading on a catch basin will cause excessive settlement of the basin's structure and could cause difficulty with deployment of a wheelchair lift. Avoid placing catch basins within bus stop zones."[21]

Bus Stop Signs

"Signs are placed to notify passengers where a bus will stop, to provide a reference for bus operators and passengers, and to publicize the system. In placing a bus stop sign, concerns for passenger and public safety, convenience, and bus stop visibility must be addressed."[22]

Street Grade

"Evaluate cross-slopes in lanes with bus circulation to avoid roller coaster effects and allow adequate bus lift deployment."[23]

Endnotes

1. Puget Sound Regional Council*, Creating Transit Station Communities in the Central Puget Sound Region - A Transit-Oriented Development Workbook,* June 1999
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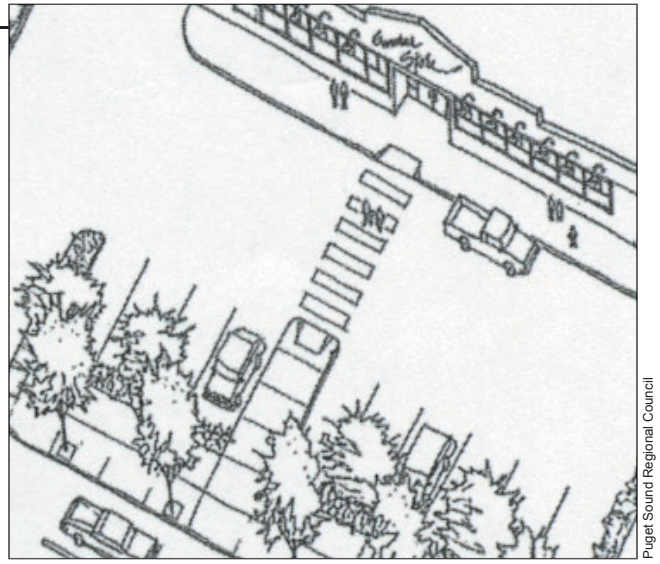
4 How to Design Streets and Parking



Puget Sound Regional Council

Connectivity

"To achieve pedestrian-friendly design, the circulation network must serve as the framework for placing and orienting buildings. Whenever possible, pedestrian routes should be along, not separate from, the street system. Streets should be designed for all travel modes, not just cars. Clear formalized, narrow and interconnected streets and small blocks make destinations visible and easier to access. They also provide the shortest and most direct route for pedestrians and bicyclists."[1]

"An interconnected street system is essential to making a station area function as a pedestrian-oriented activity center. A major function of the street system is to facilitate pedestrian circulation within the district and to link adjacent neighborhoods. The street system should provide direct connections to transit facilities, commercial uses, parks and other destinations in the station area."[2]

Block Length

"In areas where large blocks exist, new internal streets should be built to provide pedestrian-friendly connections to work places. Development sites, including parking lots, should be subdivided into blocks by local streets with sidewalks. Block perimeters should average 1200 feet with a range of 800 feet minimum to 1600 feet maximum."

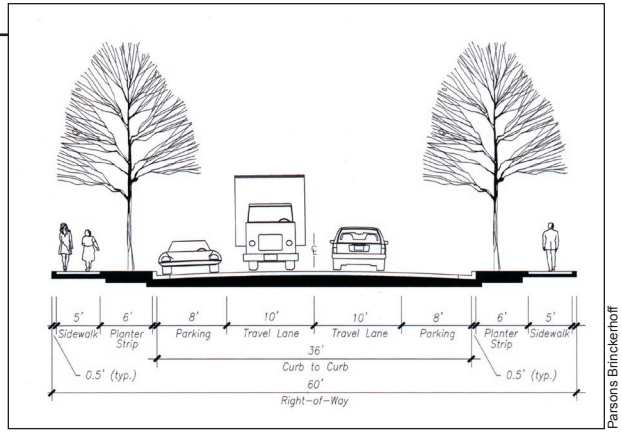
Puget Sound Regional Council, Creating Transit Station Communities in the Central Puget Sound Region - A Transit Oriented Development Workshop, June, 1999

Parsons Brinckerhoff

Creating Connections with Greenways

"Connecting neighborhoods does not necessarily entail building streets for automobiles. Lewis Mumford, famed urban scholar, suggested there are two ways to structure a city and make connections – through the traditional street and transportation network, and through its open spaces and natural elements.

Within the metro region, many new growth areas and some areas of existing development have a network of streams, ridges, or other natural features that that provide excellent opportunities to connect neighborhoods with non-vehicular 'greenways'. When properly designed, greenways also serve as protective buffers for stream channels or other sensitive areas. They also represent opportunities to integrate a biofiltering or conveyance swales…"[3]



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Narrow Streets and Pedestrian Activity

"The design of the street right-of-way is very important in enhancing the walking environment. Narrow streets help to slow traffic, reduce crossing distances, and provide space for landscaping, bike access, and on-street parking. Wider sidewalks, limited curb-cuts, street trees, awnings, and arcades can help to create a more active pedestrian environment. Public works standards should be reviewed and revised if necessary to ensure that new street design projects are sensitive to pedestrian needs."[4]

Alleys

"In areas where walking is to be encouraged, streets lined with garages are undesirable. Alleys provide an opportunity to put the garage to the rear allowing the more 'social' aspects of the home to the front of the street. Streets lined with porches, entries, and living spaces are safer because of this natural surveillance. Alleys in commercial areas place service vehicle access and parking away from the street and sidewalks, affording a more interesting and comfortable streetscape."

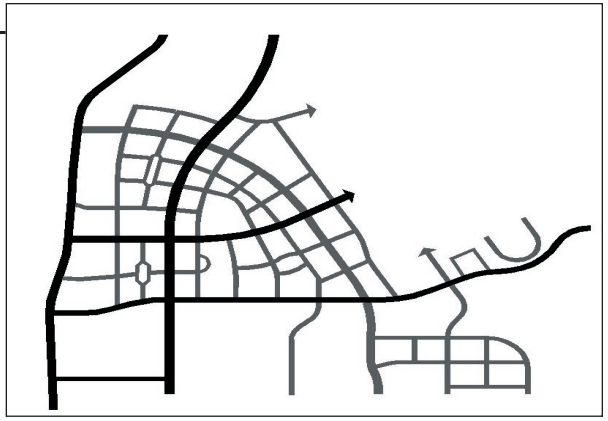
Calthorpe Associates, Transit Oriented Development Guidelines for Sacramento County Planning and Community Development Department, September, 1990

Parsons Brinckerhoff

Multi-Modal Street Design

"To assure regional mobility in the future, an extensive network of multimodal streets will be needed. Multimodal streets balance the needs of pedestrians, bicycles, cars, trucks and transit vehicles in a way appropriate to the particular function and location of a road or street. Some roads may give more priority to cars and trucks; others may give priorities to transit vehicles and pedestrians. Some of the benefits of multimodal street design are:

- Preserves mobility by encouraging transportation facilities and development patterns that make walking, bicycling, and busing competitive choices compared with driving,
- Encourages more efficient movement of people on roadways, rather than the addition of more vehicles, and
- Increases the capacity of the existing street system."[5]



Parsons Brinckerhoff

Street Patterns

"The street pattern should be memorable, avoid winding, dead end roads, dead end streets, and cul-de-sacs. With an interconnected street system, any single street will not be overburdened by excessive traffic, thus reducing the need for cul-de-sacs. A street pattern which is circuitous and complex will discourage pedestrians; a street system with landmarks and a simple form will be memorable and familiar.

"Clear, formalized and inter-connected street systems make destinations visible, provide the shortest and most direct path to destinations, and result in security through community, rather than by isolation."[6]

Sno-Tran

Street Vitality

"As Jane Jacobs has written,'Streets and their sidewalks, the main public places of a city, are its most vital organs'. Neighborhood streets are an important element of the design of livable residential communities. They perform many diverse functions, serving as:

- Public space defining collective values and civic sensibility,
- Spaces for social interaction,
- A framework that gives structures an address, access, and identity,
- Public infrastructure for the through movement of traffic and vehicular access to private dwellings,
- Places for storage of vehicles,
- Places for cycling,
- Walking environments and play spaces,
- Locations for underground services including sewer, water, gas, electricity, cable television, and telephone and
- Places for the storage of snow."[7]

Parsons Brinckerhoff

Carefully Designed Intersections

"Intersections should be designed to facilitate both pedestrian and vehicular movement by slowing traffic and reducing pedestrian crossing distances. Minimizing curb radii at intersections reduces pedestrian crossing distances, as well as the speed of cars. Unless absolutely necessary for safety, right and left turn lanes at intersections should be avoided."[8]

Twin Creeks Development Company/ Martin Kyle-Milward

Traffic Calming

"Slowing auto traffic in the TOD is desired to create a safer, more comfortable pedestrian environment. Minimum street dimensions are intended to make streets more intimate in scale while providing for municipal service vehicle access and maintaining auto safety. Smaller street sections will reduce street crossing dimensions and result in cost savings which can, in turn be allocated for pedestrian amenities."[9]

Parsons Brinckerhoff

Trees

"Trees are an important element in the creation of liveable communities. Trees add color and contrast to the street. They moderate the micro-climate of the street, filter pollution, and can act as a separator between uses.

"Many consider the right-of-way the most appropriate location for trees since this gives the municipality clear control over their care, protection, and, when necessary, replacement. Some park departments suggest that trees be given the status of a utility and that a location within a right-of- way be reserved for it. Formal and organized tree planting programs on private lots are, however, an alternative to locating trees within the right of way. When the latter approach is utilized, selected tree species are typically planted in set locations by the developer or house builder. The advantage of this approach is that trees can often be located farther from the underground and surface elements of the right of way and thus are likely to be undisturbed. The disadvantage is that the care and maintenance of trees are not guaranteed since they become a homeowner rather than a municipal responsibility."[10]

Parsons Brinckerhoff

Street Trees

"Street trees and other landscaping provide a pleasing contrast and softening of the urban environment. They enliven streetscapes by blending natural features with built features. Street trees, when planted between sidewalks and streets, buffer pedestrians from vehicles."[11]

Parsons Brinckerhoff

Tangible Cost Benefits with Street Trees

"The March 2002 report from the Center for Urban Forest Research, *Western Washington and Oregon Community Tree Guide: Benefits, Costs and Strategic Planting*, used a numerical simulation model to estimate annual rainfall interception of three common street tree species of small, medium and large stature. The model includes rainfall intercepted, as well as the amount of throughfall and stem flow. The study found that the average annual benefits of a tree increase with age and that larger trees produce more water quality savings. The average stormwater management costs savings of a large tree (red oak) was $15.25 per year through the first 40 years of tree life. By the 40th year, the tree intercepts more than 1,100 gallons of stormwater, providing a cost savings of more than $30. Therefore, designing a street that encourages large long-lived tree species with broad canopies and maintaining those trees through a long life provides a tangible cost benefit to a stormwater management agency."[12]

Parsons Brinckerhoff

Lighting

"Street lighting is required on all streets and lanes. Lights should be installed to achieve appropriate and acceptable light levels to ensure safety and to deter criminal activity. On narrower roads the lights can be located on one side of the street only. On wider roads, lights are typically required on both sides. Lighting levels, pole heights, and fixture designs should be at a scale that is compatible with the street or lane design."[13]

Parsons Brinckerhoff

Parsons Brinckerhoff

Automobiles within the TOD

Automobile Access

"Transit station communities should be developed recognizing that many trips even within the station area will still be made using cars. To that end, the street system within the station area is very important and needs to be designed to accommodate the conflicting demands of auto and pedestrian travel. The traditional grid pattern with interconnected streets and small blocks provides the greatest level of accessibility within station areas and to the rest of the community. A grid (or other dense network of interconnected streets) has the shortest trip lengths, greatest choice of routes, and is easiest to expand. In contrast, typical suburban street systems create large blocks with wide arterial spacing and few local street connections. These areas often lack direct routes between station areas and adjacent neighborhoods. Research has demonstrated that grid network designs can result in more direct routing of vehicles than suburban street networks. Comparisons of activity areas with similar land uses have shown that vehicle miles traveled can be reduced by between 10 to 40 percent where streets are interconnected along a system of small blocks."[14]

"In the contemporary metropolis, development must adequately accommodate automobiles. It should do so in ways that respect the pedestrian and the form of public space."

Congress for the New Urbanism, Charter of the New Urbanism, McGraw-Hill, New York, 2000

Dan Burden, Courtesy of Pedestrian Bicycle Information Center

Parsons Brinckerhoff

Parking Design

Parking Management

"Managing the growth of surface parking represents a major challenge to TOD. Typical suburban development projects devote 50 to 75% of their sites to surface parking. The result is land use densities that are too low to serve frequent and fast regional transit service. A more limited parking supply encourages residents, employees, and shoppers to use transit. Surface lots separate buildings from public streets, making it difficult for pedestrians to walk between buildings and to transit facilities. Parking management provides alternative strategies to traditional surface parking and can result in more compact developments. If properly designed and located, auto parking can be provided to meet demand and not negatively impact the pedestrian environment."[13]

Control the Total Supply of Parking

"Too much parking in a station area discourages TOD by discouraging pedestrians, since parking lots are an unpleasant pedestrian environment and make distances between uses inconveniently great. Large parking lots also thwart TOD by consuming land that might otherwise be developed with uses that could attract new transit riders. Finally, abundant, free parking makes driving too convenient, which is a disincentive for people to use transit. Controlling the parking supply is an excellent way to shift people to other modes of travel including transit."[14]

Dan Burden, Courtesy of Pedestrian Bicycle Information Center

Parsons Brinckerhoff

Reduce the Impact of Parking

"The single most effective way of reducing the impact of large areas devoted to parking is to build parking structures. Property values, proximity to riders, and existing development character all play a role in the viability of structured park and ride facilities. When planning park-and-ride facilities, create an environment that encourages walking."[17]

Reduce the Impact of Impervious Parking Lots

"An overall strategy for reducing parking lot runoff is reducing the actual parking areas by using shared parking facilities and structured parking.

Structural design solutions include stormwater bioretention areas, vegetated swales and filter strips that can be integrated into landscape areas and traffic islands. If designed properly, these areas would be both functional and attractive.

The use of porous pavements also is appropriate for parking lots where travel speeds are significantly lower than roadways. An option that can add visual interest to the parking lot and increase permeability is to vary the surface materials between travel land and parking stall."[18]

Encourage Ground Floor Development in Parking Structures

"Design parking lots and structures so they do not dominate the frontage of pedestrian-oriented streets or establish impediments to pedestrian routes. Retail or other land uses should be located on the ground floor and incorporated into the building's design. Portions of parking structures that do not have first level retail uses should be designed to have an appearance that blends with neighboring structures."[19]

Parsons Brinckerhoff

Surface Parking

"Parallel parking is encouraged on all TOD streets except arterials."[20]

"Streetside parking is critical to keeping the focus of a community on the street, rather than on the interior of lots. Parallel parking helps to create street activity, as well as provide functional spaces. It supports orienting building entries to the street by providing convenient access for guests and patrons."[21]

"Parking lots should not dominate the frontage of pedestrian-oriented streets or interrupt pedestrian routes. Parking lots should be located behind buildings or in the interior of a block, whenever possible. In no case shall surface parking lots occupy more than 33 percent of the frontage of a pedestrian-oriented street."[22]

- "Where parking is or can be located at the side or rear of buildings, attractive, public pedestrian connections to the primary street should be created. Signs should be posted to direct drivers to parking entrances that may not be obvious."[23]
- "Encourage commercial district people and employees to use transit or limit employee parking to remote spaces, freeing the most desirable spaces for customers."[24]
- "Consolidate parking in public or private shared lots. Where shared parking is desirable, consideration should be given to time-share possibilities. Merchants are encouraged to share parking with other users that need parking primarily during hours when stores are closed, e.g., a movie theatre or church."[25]

Parsons Brinckerhoff

Park and Ride
"Park-and-ride lots may be a desirable interim use of land along older commercial streets near outlying transit stations where newly concentrated commercial uses near the station lie between transit rider and parking. Such lots may also provide shared parking opportunities for nearby residents that drive to other areas to work but could use the lot after hours."[26]

Incorporation of Automotive Services
Automotive service uses can be accommodated with TOD. This gas station/convenience store is located in a TOD overlay zone adjacent to the East-side light rail in Portland, Oregon. The overlay zone stipulated that buildings be located at the property line. In this case, the gas pumps are located behind the building and out of view from the transit platform.

Endnotes

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5 How to Design Pedestrian and Bicycle Facilities

Parsons Brinckerhoff

"What is it that makes it so hard sometimes to determine whither (where) we will walk? I believe there is a subtle magnetism in Nature, which if we unconsciously yield to it, will direct us aright."
Henry David Thoreau

Design Development for Pedestrians and Bicycles

Pedestrian Routes

"A continuous sidewalk system should be established within the station area. Pedestrian routes should be located along or visible from all streets and provide clear, comfortable, and direct access to the core commercial area and transit stop. When street connections are not feasible, short pedestrian paths should provide walking connections. Walkways between buildings are encouraged when blocks are large."[1]

Weather Protection in Urban Areas

"Urban areas require weather protection for pedestrians. Weather protection needs to be a minimum of 6 feet wide and shall be integrated into the architectural character of the buildings."[2]

Parsons Brinckerhoff

Sidewalks

"Comfortable sidewalks are key to reinforcing a pedestrian environment within a TOD. The comfort and convenience of the pedestrian trip will reinforce the efficiency of the transit system by creating destinations which are attainable without a car and origins which do not depend solely on park and ride mode transfers."[4]

- "Connect the bus stop with adjacent pedestrian destinations, including building entrances, street crossings, other walkways and with the nearest intersection.
- Minimize barriers (landscaping, berms, or fences) that impede pedestrian access or visibility.
- Provide buffers between pedestrians and moving traffic without obstructing bus boardings/deboardings.
- Vary sidewalk and buffer widths depending on traffic volumes and speeds and on pedestrian volumes (i.e., increase buffer widths as speeds increase; increase sidewalk widths to accommodate increased pedestrian volumes)."[5]

"The preferred sidewalk width in a downtown is 12 feet, at least 6 feet of which must be clear of obstructions. This width allows pairs of pedestrians to walk side by side, or to pass each other comfortably. It generally provides enough width for window shopping, some street furniture, and places for people to stop. More width is desirable to accommodate bus shelters, sidewalk cafés, and other outdoor retail.

Where it can be justified and all other measures have been examined (such as narrowing or eliminating medians, bike lanes, parking lanes or travel lanes), the sidewalk width can be reduced to as narrow as 8 feet. In general, however, the rule is: the wider the sidewalk, the more pleasant the pedestrian experience."[6]

Dan Burden, Courtesy of Pedestrian and Bicycle Information Center

Parsons Brinckerhoff

Pedestrian Street Crossings
"Pedestrians must be able to cross streets easily and safely at many different points within the station area if they are to do without their automobiles. Signalized, well-designed pedestrian crossings should be provided at all road intersections in the station area. 'Bulbs' and median strips should be used to shorten or break up crossing distances, and mid-block crossings should be established where intersections are far apart."[3]

Pedestrian Amenities
"Along with comfortable transit stops, it is important to provide other amenities that increase the comfort and safety of pedestrians. These amenities have many practical applications but they also play an important role in elevating the place of the pedestrian and transit user in the built environment."[7]

"Clearly articulated pedestrian areas with smaller dimensioned surfaces and site elements improve pedestrian safety by distinguishing the pedestrian network from car, bike or transit circulation. The treatment of sidewalks, streets, and driveways is particularly important at points where they intersect."[8]

Bikeways
"Biking can be a major alternative to the auto for local trips or trips to the transit stop. Separated or marked bike lanes on several primary routes to the core area will support this alternative. On smaller streets, bikes sharing the travel lane will help slow cars to speeds more appropriate for residential streets."[9]

Bike Parking
"Bike racks or other bike storage facilities must be provided at various shopping, transit, and employment destinations in the TOD. Bike parking may be shared between uses, but should be centrally located, easily accessible to building entries, and visible from streets or parking lots."[10]

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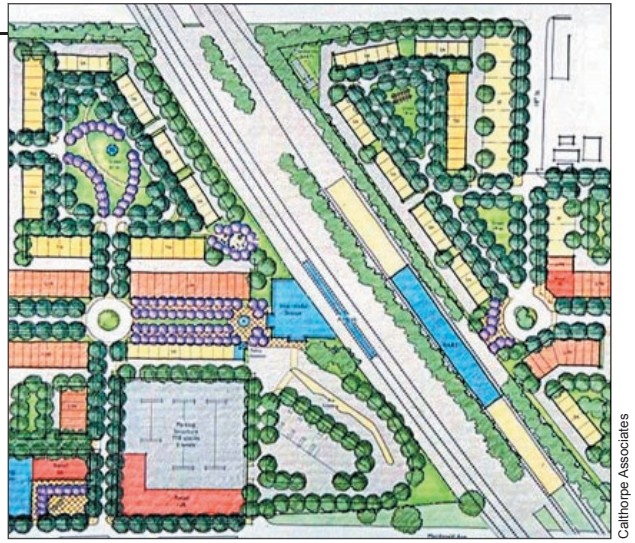
6 Creating a Framework for TOD



Calthorpe Associates

> "Do not make TOD a laboratory for developers"
>
> Kim Knox, Sheils Obletz Johnsen

Pursuing Livable Communities

Progressive developers have long known how to successfully implement and profit from building conventional residential, commercial, urban, suburban, industrial, and office development projects. TOD incorporates, modifies, and integrates these conventional development products to create walkable communities that are less dependent on the automobile.

"Communities throughout the United States are pursuing patterns of development that make walking and transit use more convenient. Major land use incentives - which seek to make possible effective alternatives to auto-dependent lifestyles - are underway in metropolitan regions as diverse as those in Salt Lake City, San Diego, Minneapolis/ St. Paul, Orlando, Washington, D.C., and Portland, Oregon.

"These efforts respond to the myriad of problems attributable to the boundless mobility of the car. This mobility makes dispersed destinations increasingly reachable, but at a cost. Faced with mounting congestion and longer commutes, interest in smarter forms of growth has mushroomed. The primary building block of these smart growth efforts is transit-oriented development (TOD)."[1]

Parsons Brinckerhoff

"Communities have always developed along transportation routes, and savvy real estate developers have always been there to lead or participate in their growth"

Jim Miara "On Route" Urban Land, May 2001

The TOD Strategy

"The (TOD strategy) seeks to address the (county's) most pressing problems: urban sprawl, escalating traffic congestion, non-attainment of regional air quality standards, and growing demand for housing opportunities which meet the needs of an increasingly diverse population. These growth strategies (TOD) also recognize that reliance upon typical patterns of low density urban development will not address these problems, and new forms of urban development are needed…. Consistent with these concerns (are) the following guiding principles:

- Maximize the use of existing urbanized areas.
- Reduce consumption of non-urban areas.
- Link land use with transit.
- Reduce the number of auto trips and regional Vehicle Miles Traveled (VMT).
- Reduce air pollutant emissions.
- Provide a diversity of housing types.
- Design the urban area efficiently.

"In the TOD strategy, new moderate and high density housing, as well as new public uses and a majority of neighborhood serving retail and commercial uses, will be concentrated in mixed-use developments located at strategic points along the regional transit system. The linkage between land use and transit is designed to result in an efficient pattern of development that supports a regional transit system and makes significant progress in reducing traffic congestion and air pollutants. The TODs mixed-use clustering of land uses within a pedestrian-friendly area connected to transit provides for growth with minimum environmental and social costs."[2]

Strategic Improvement Plan for the City of Auburn

The City of Auburn undertook an ambitious Main Street Improvement Project to prepare the downtown for ultimate transit station development and to encourage private investment. Based on a strategic downtown improvement plan, the City initiated a series of street and pedestrian improvements that, along with a reduced interest loan program, led to significant private storefront and parking improvements. With a much more attractive setting, the City is poised to take advantage of the potential station area development opportunities.

Puget Sound Regional Council, Creating Transit Station Communities in the Central Puget Sound Region - A Transit Oriented Development Workshop, June 1999

Parsons Brinckerhoff

Demonstrate Public Commitment to Private Investment

Private investment follows public commitment" is the advice given by public and agency officials who have worked with the development community to move TOD plans from the shelf to the ground.

"Knowledgeable private investors and developers are often reluctant to 'pioneer' non-traditional developments. This is especially true in locations that are economically distressed, have little in the way of recent investment by others, or have a reputation for crime or other social problems. A station area plan should outline the public investments necessary to spur private development. The most significant barriers to investment must be removed or neutralized by public commitment in the form of personnel and capital. This sends a clear signal that the public sector is prepared to pave the way and make it safe for private capital to follow."[3]

Parsons Brinckerhoff

Market Potential Development Opportunities

"The marketing strategy should be used as a vehicle to 'sell' transit-oriented development opportunities at the station area to the variety of players that make up the development community - developers, property owners, bankers and others".[4]

Parsons Brinckerhoff

> "To be effective, transit agency representatives must be involved early, while the site plan – and the developer's budget – are still relatively flexible."
>
> Snohomish County Transportation Authority, Participating in Community Planning: Ideas for Public Transit Agencies, October 1993

Establish Development Incentives

"Often developers will need an incentive of some sort if they are going to commit to the generally more risky practice of transit-oriented development. A wide variety of incentives are available to local jurisdictions to foster private development interest. Incentives can be in the form of:

- Density bonuses for providing certain amenities,
- Favorable permit review procedures for certain development, or
- Direct cash outlays for public improvements that support a development ."[5]

"Incentives that have been tried with success include covering the cost of a market analysis for a site or preparing a prototypical pro-forma to demonstrate the feasibility of various types of development to potential financiers. One of the strongest incentives that have been used is a tax incentive. Both Minneapolis/St. Paul and Portland provide developers the potential for reductions in their property taxes if certain conditions are met."[6]

Provide Public Facilities and Infrastructure

"Before private capital will come to a station area, some infrastructure improvements are often needed to improve the safety, appearance, or function of a location. Infrastructure investments also demonstrate a public commitment to an area and can signal increased investments over time - always a good sign to the development community. BART, in California, and other systems have used this strategy with considerable success. Some of the public improvements at station areas could include a police substation, a pedestrian plaza, a bus turnaround facility, new drainage and water systems, and placing certain utilities underground."[7]

"Public facilities, such as libraries, performing arts centers, recreation centers, parks, and city halls can be a powerful magnet. In developing a capital improvement program, each location should develop a strategic plan for investments in public facilities and infrastructure that support transit-oriented locations near the station facility."[8]

Removing Barriers to TOD Implementation

Minimize the Financial Risk

- Make it easier to obtain financing
- Conduct financing workshops and tours with lenders
- Show successful FAR's and reduced parking examples
- Show examples of diversified products and faster market absorption

Provide Options for Financing*

- Seek Federal Funds
- Use Housing and Community Development Funds
- Establish a Main Street Program
- Apply for Historic Preservation Tax Credits
- Establish a Redevelopment Area
- Set Up Public-Private Partnerships
- Build on Public and Tax-Delinquent Land
- Establish Special Assessment Districts
- Use the General Fund
- Subsidize the Retail Component
- Pursue Grants and/or Local Donations

Establish Cost-Saving Measures into the TOD Project Sites*

- Zone Appropriate Properties "By-Right"
- Streamline the Permit Process for Desired Projects
- Reduce or Delay Development Fees
- Adjust Level of Service Requirements
- Reduce Parking Requirements
- Establish Enterprise Zones in Older Activity Centers
- Educate Banks and Provide Loan Guarantees
- Conduct Market Studies and Marketing
- Seek Free/Low-Cost Technical or Material Assistance

*Penisula Corridor Joint Powers Board, Transit Oriented Development Guidelines - Building a Gateway to Community with Strategies for Infill, Redevelopment and New Growth Along the Caltran Corridor, October 1997

Parsons Brinckerhoff

Participate in the Private Development Process

"Package and assemble land for development - Public action in helping to package, secure and assemble land for transit-oriented development purposes can be one of the more powerful tools for creating transit station communities. Assembly of land can be an effective way to achieve development that is of sufficient size to be economically viable and spur a change in station area land use patterns."[9]

"Participate in or help in securing public financing - In some cases, aggressive financial participation and risk sharing can help to stimulate transit-oriented development. One means of risk sharing is the underwriting of land costs in return for project participation. As an example, an agency might accept below market rents on land leased to a developer in return for a percentage of the project revenues over a specified period. Transit agencies throughout the country have used this technique with success including BART in San Francisco, Metro in Washington DC and in San Diego."[10]

"Participate in Joint Development - "Joint development" involves public and private sector cooperation in planning, design and construction of residential, commercial, or mixed-use projects near transit in a manner that maximizes the skills and contributions of each sector. Joint development is based on the concept that transit investment and commercial development can be integrated to create value, both financially and in terms of public benefit."[11]

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Go Out "Into the Field"

"Take a walk around the community. Visit transit and transportation facilities and observe what kinds of activities occur there. Talk to people, and ask them what works and what doesn't work about the place. Listen to their suggestions. Through this process, you will develop a better understanding about how a place operates and how it can be improved."

Project for Public Places, Inc., How Transportation and Community Partnerships are Shaping America, Part I: Transit Stops and Stations, 1999

Development Opportunities at Different Station Locations

"Regional Urban Center

A regional urban center is an area of high density and intensity of uses that support the primary transit connections in the region.

"Types of Development Opportunities:

- Mixes of high density and high intensity uses which include mid-rise and high-rise offices, retail and specialty shopping, support services, high and medium density residential, and cultural and public facilities, and
- Opportunities for redevelopment and infill development.

"Community or Town Center

A community or town center is a focal point for a smaller community or a major grouping of neighborhoods.

"Types of Development Opportunities:

- Medium to high density housing, commercial uses and office uses,
- Redevelopment and infill opportunities,
- Scale of development is lower in neighborhoods, and
- Small-scale mixed-uses along main streets connecting to transit facility.

"Emerging Suburban Center

A typical suburban center is a gathering place, such as a shopping center or office park.

"Types of Development Opportunities:

- Primarily commercial and office-related uses, with some opportunities for medium density multi-family development, and
- Opportunities for future development of parking lots and redevelopment of obsolete buildings."[12]

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Retail Opportunities Adjacent to Transit Facilities

"Retail developments can serve transit riders going to and from bus stops and rail stations while at the same time capturing the neighborhood walk-in market. The design of these developments can emphasize the pedestrian environment, without sacrificing convenient auto access to do so. In addition, transit riders don't need parking, minimizing land cost in urban areas."[13]

Retail Opportunities in the Station Areas

"Small retail stores and services on a traditional commercial street can capture much of the transit riding market by ensuring that the mix of businesses serves riders needs, acknowledges their time constraints, and provides an attractive environment for patrons who might drop in to or from work. Merchant associations and chambers of commerce can be effective partners in addressing these issues."[14]

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Maintain Station Areas with Community Involvement

"Block clubs, community groups, and business associations can help strengthen these markets by participating in cooperative efforts to improve connections to transit. Volunteer neighborhood clean-up efforts, adopt a station programs, and landscape maintenance can contribute greatly and set the tone for cooperation."[15]

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TOD Provides Long Term Value

Profiting with TOD may not happen overnight - the bottom line of the TOD strategy requires a long-term commitment to growing smart and creating neighborhoods with long-term value.

"The "new" real estate developer needs to become an expert in community building and to adjust their business expectations to a longer term view. New Urbanist developers are building much more into their communities (street trees, parks, and other amenities); thus it takes longer to harvest the full value of their investment. A New Urbanist developer needs to look to a time horizon of 20 to 30 years, not just the first 5 years when most lots and new homes have sold."[16]

"If you are a transportation agency, reach out to community organizations, businesses, and local officials to elicit their ideas and opinions - and support. If you are a community organization, get in touch with the staff of your transportation or transit agency. Invite them for a tour or site visit of an existing or proposed project. Discuss ways of working together to plan, design, and implement a project."[17]

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16. Rosenkrantz, Valerie, *Principles and Practices of Marketing the New Urbanism*, The Market for Transit-Oriented Development; Proceedings of a Workshop Presented by the Regional Transportation Authority of Northeastern Illinois, November 1995
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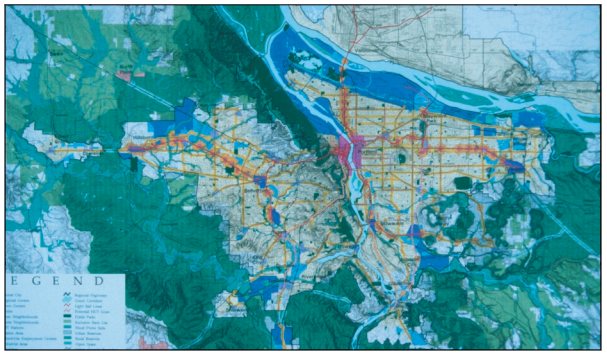
7 Ten Lessons Learned

Reviewing built TOD projects and the important lessons they teach

Since the late 1980's TOD has evolved from a planning theory to implementation. There are now numerous built TODs to study and learn from. Drawing on our interviews with planners, developers, local officials and TOD profiles it is possible to offer some key lessons that will be useful for practitioners using this guidebook.



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1. Key Lesson - TOD can be a Catalyst for Achieving Broader Planning Objectives:

TOD is most likely to be successful when it is implemented as part of a community's vision for future growth. As part of a larger vision, TOD can be used as a tool to achieve broader community goals for growing smart, while at the same time reinforcing the community's investment in transit.

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2. Key Lesson - Community Partnerships are Essential:

TOD requires coordination between local land use agencies and transit districts to plan and implement transit improvements and land use development. TOD is most successful when project leadership is shared with the community, local jurisdictions, developers, financial institutions, and transit agencies. Local governments can assume a primary role in promoting TOD by developing plans, policies, zoning provisions, and incentives for supportive densities, designs, and mix of land uses.

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3. Key Lesson - Design for the Pedestrian:

To function properly, the TOD site plan, transit facilities, and connections to the surrounding community need to be designed with the pedestrian in mind.

a. Easy access to the transit stop: Easy and convenient pedestrian access to the transit stop is of critical importance in any TOD design. Clearly defined, comfortable, highly visible, and safe walking and bicycle routes should lead to the transit stop with a minimum number of street and intersection crossings.

b. Walkable TOD site design: TODs should be designed so that the people living, working, or shopping in the neighborhood will find it convenient to walk or bike to neighborhood parks, shopping opportunities, and employment centers.

c. Connections to the community: New TOD projects should include multi-modal and contextual connectivity by having circulation patterns that capitalize on existing street, pedestrian, park, and open space networks. TODs work best when they are integrated into the surrounding community rather than standing apart from them.

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4. Key Lesson - Start TOD Work Early:

Communities interested in promoting TOD need to consider TOD in the design and location of transit facilities. Too often, transit systems are designed without considering TOD's potential. Transit stops are located in areas with little or no development potential and transit facilities are dominated by commuter parking. With careful consideration, transit can be designed both to accommodate TOD and fulfill basic transit functions.

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5. Key Lesson - Parking is One of the Most Important Land Uses in a TOD:

How to design parking lots and how much parking to provide are perhaps the most critical land use decisions that need to be made when planning for a compact, walkable TOD. The challenge is to provide for the automobile without being dominated by it. Parking needs to be analyzed at two levels: where it should be on the site and to what extent the number of parking spaces should be reduced.

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6. Key Lesson - Plan for a Mix of Uses:

Promoting compact development and reducing automobile use can best be achieved through a mix of land uses. TODs can offer places to shop, work, live and recreate. Mixing uses in TODs offers additional opportunities to reduce parking requirements and increase transit use.

7. Key Lesson - TOD Requires Experienced Leadership:

Successful TOD teams will include people with significant experience in real estate development and transit planning. Successful TOD implementation typically involves a number of elements, such as optimal transit system design; community partnerships; understanding local real estate markets; planning for TOD; coordination among local, regional, and state organizations; and providing the right mixes of planning and financial incentives.

Fletcher Farr Ayotte

8. Key Lesson - Density Does Matter in TOD Performance:

Increasing the density in areas around a transit station can lead to a corresponding increase in transit ridership. Furthermore, increasing density has also been found to have the opposite effect on automobile usage (e.g., reducing the need for a car).Transit use rates begin to increase at an average overall density of around six to seven households per residential acre as vehicle trips decline. At around 50 households per acre, the number of trips taken daily by vehicles, transit, and walking become about the same. Increased densities have also been found to correspond with decreased levels of auto ownership.

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9. Key Lesson - Most TOD Occurs after New Transit Service is Established:

Patience may be necessary when working with the development community. TODs are rarely built to coincide with the opening of new transit facilities. Instead, some developers and local planners tend to wait to see how new transit service is accepted by the community before investing in adjacent real estate. Once an initial track record of TOD is established, the pace of implementation tends to accelerate. Taking the long term view and protecting the opportunity for TOD by not allowing transit-adjacent development to occur around transit facilities is critical. An effective strategy to overcome skepticism about the market for TOD is to require projects to be pedestrian-friendly. If the project works for pedestrians today, it will work for transit tomorrow.

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10. Key Lesson - Demonstration Projects can Accelerate TOD Implementation:

For many communities, a critical step to more widespread TOD implementation is the development of successful demonstration projects. Even though market forces and public policy have become increasingly "TOD-friendly," concerted action is needed to spur the creation of new development models in some communities. TOD demonstration projects can provide real estate developers with the appraisal comparables, market performance information, and physical evidence they need to justify experimenting with new development models.

Appendix

TOD Evaluation Checklist

For development to be transit-oriented, it needs to be shaped by transit with respect to parking, density, and/or building orientation when compared to conventional development. It is not sufficient to merely locate development adjacent to transit.

Local governments play a significant role in promoting TOD through plans, policies, zoning provisions, and incentives for supportive densities, designs, and mix of land uses. A successful TOD will reinforce the community and the transit system. This checklist is intended to guide communities as they review proposed projects and assess the transit-friendliness of current land use codes and ordinances.

Within an easy walk of a major transit stop (e.g., 1/4 to 1/2 mile walk),
consider the following:

Land Use

- ☐ Are key sites designated for "transit-friendly" land uses and densities (i.e., walkable, mixed-use, not dominated by activities associated with significant automobile use)?
- ☐ Are "transit-friendly" land uses permitted outright, not requiring special approval?
- ☐ Are higher densities allowed near transit?
- ☐ Are multiple compatible uses permitted within buildings near transit?
- ☐ Is the mix of uses generating pedestrian traffic that is concentrated within walking distance of transit?
- ☐ Are auto-oriented uses discouraged or prohibited near transit?

Site Design

- ☐ Are buildings and primary entrances sited to be easily accessible from the street?
- ☐ Do the designs of areas and buildings allow direct pedestrian movements between transit, mixed land uses, and surrounding areas?
- ☐ Does the site's design allow for the intensification of densities over time?
  - Are the first floor uses "active" and pedestrian-oriented?
  - Are amenities provided to create an interesting and enjoyable pedestrian environment along and between buildings?
  - Are there sidewalks along the site frontage? Do they connect to sidewalks and streets on adjacent and nearby properties?
  - Are there trees sheltering streets and sidewalks? Is there pedestrian-scale lighting?

Street Patterns and Parking

- ☐ Are parking requirements reduced in close proximity to transit, compared to the norm?
  - Is structured parking encouraged rather than surface lots in higher density areas?
  - Is most of the parking located to the side or to the rear of the buildings?
  - Are street patterns based on a grid/interconnected system that simplifies access?
  - Are pedestrian routes buffered from fast-moving traffic and expanses of parking?
  - Are there convenient crosswalks to other uses on-and off-site?
  - Can residents and employees safely walk or bicycle to a store, post office,
- ☐ Does the site's street pattern connect with streets in adjacent developments?

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Funding for this report was provided by:
The Maryland Department of Transportation

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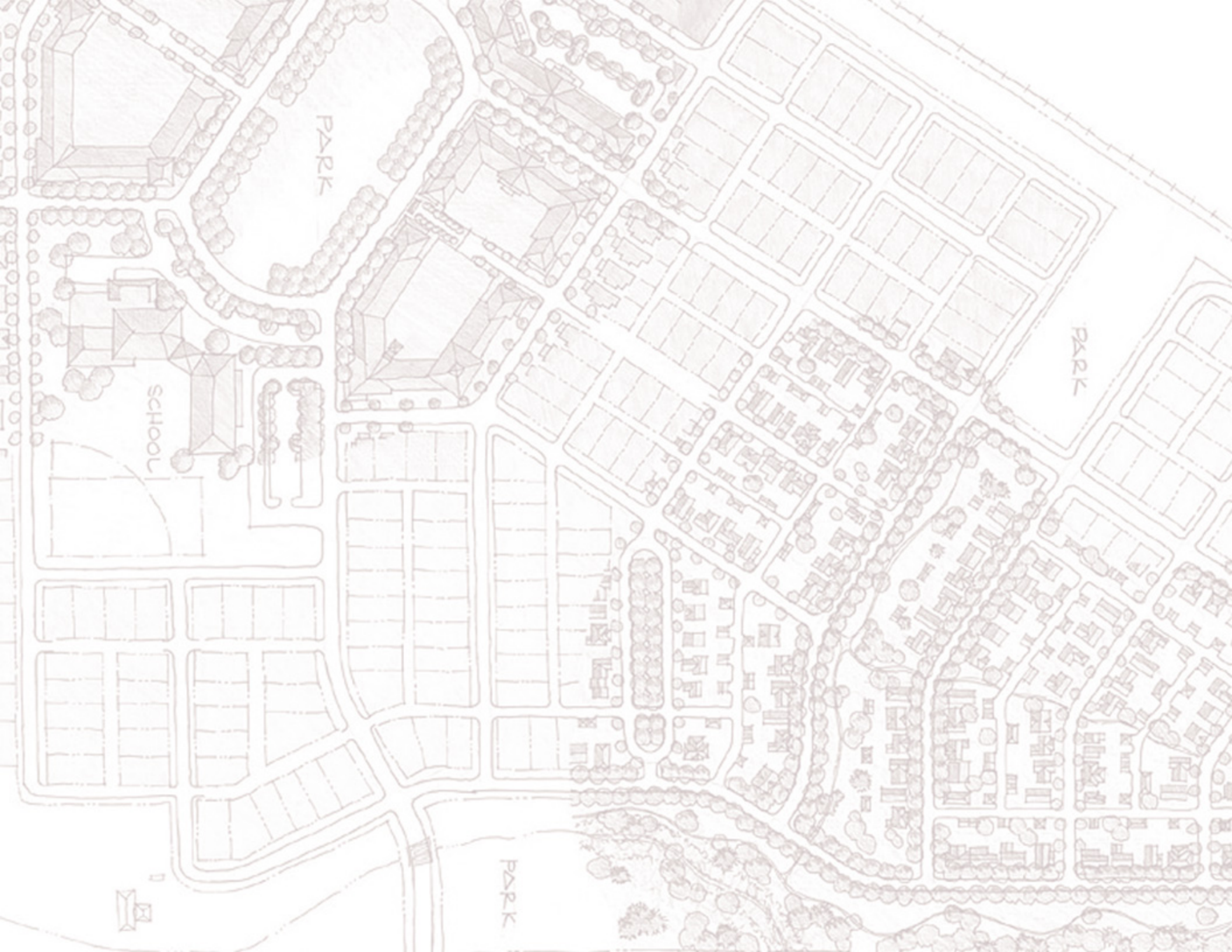
January 2003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